APGA Security and Integrity Foundation

making systems safer

Distribution Integrity Management Programs (DIMP) & SHRIMP

Kansas Pipeline Safety Seminar

Salina, Kansas

October 28, 2009

apgasif.org

Distribution Integrity Management Programs (DIMP) History & Future

- 2001 – Liquid Integrity Management Rule
- 2003 – Transmission IMP Rule
- 2004 – DOT Inspector General Testifies
- 2005 – PHMSA Issues Phase 1 Report
- 2006 – Gas Piping Technology Committee (GPTC) Prepares Guidance
- 2008 – Notice of Proposed Rule (June 25, 2008)
- 2009 – Expected final Rule (November, maybe?)
- 2011 – 18 months after final rule – must have written DIMP Plan in place

Definitions

- Integrity = Ability of pipe to keep gas inside
- Integrity Management = Focusing resources on the areas of greatest risk
- Risk = Probability of a failure X consequences should a failure occur
- Failure = Loss of integrity, e.g. a leak, a rupture, unintended release of gas
- Threat = Things that can lead to a failure (corrosion, excavation damage, etc.)
- Additional/Accelerated Actions (AA Actions) = Actions over and above minimum rule requirements to address one or more threats

Example: Risk of Corrosion

- Some probability factors:
  - Material of construction (plastic or steel)
  - Cathodically protected?
  - CP levels adequate?
  - History of corrosion-caused leaks?
- Some consequence factors
  - Pressure/diameter
  - Under wall-to-wall pavement
  - Significance of the facility (e.g. sole-source feed?)

Phase 1: 7 Elements of a DIMP Plan

1. Develop a written integrity management plan
2. Know your infrastructure
3. Identify threats (existing and potential)
4. Assess and prioritize risk
5. Identify and implement measures to reduce risks
6. Measure and monitor performance, and
7. Report results

SHRIMP Development

- Funded through a cooperative agreement with PHMSA
- Advisory Group made up of state regulators, federal regulators and industry
- Technical Toolboxes, Software developer
- Heath and Associates, Technical Consultant
- Viadata, Technical Consultant

Introducing SHRIMP!

- Simple, Handy, Risk-based Integrity Management Plan

SHRIMP

- Software product similar to tax preparation software (TurboTax)
- SHRIMP asks the user a series of questions about the system and its inspection and maintenance history
- Questions change based on answers
- Output is a customized DIMP Plan addressing all 7 elements and any other provisions in the rule

SHRIMP Timing

- Due 6 months after final rule
- GOAL: Have SHRIMP trial version available when final rule is issued.
- That way utilities can decide whether to use SHRIMP or other means to develop DIMP
- http://shrimp.gas-distribution.com
- SHRIMP is not limited to small utilities, municipal utilities or APGA members

Go To SHRIMP Written Plan

2. Know Your Infrastructure

- SHRIMP asks questions to obtain appropriate infrastructure information:
  - Material(s) of construction
  - Leak history
  - Repair history
  - Inspection records, such as :
    - Cathodic protection
    - Leakage surveys
    - Exposed pipe inspections

3. Identify Threats

- SHRIMP includes questions for all 8 threats, based on GPTC and Advisors
- Phase 1 identified 8 threats:
  - Corrosion — Material or Welds
  - Natural Forces — Equipment
  - Excavation — Operations
  - Other Outside Force Damage — Other

4. Assess and Prioritize Risk

- Rank those 8 threats to entire pipeline or to pipeline segments
- SHRIMP uses an index model developed by the Advisors that applies weighting to the various probability and consequence factors

5. Implement Actions to Reduce Risks

- SHRIMP offers Additional/Accelerated Actions for each threat, based on GPTC Guide
- Based on threat questions, SHRIMP may suggest or rule out some AA Actions
- Operators may choose a SHRIMP option, or describe their own actions to address threats
- Choices are written into the DIMP plan

6. Measure and Monitor Results

- SHRIMP offers options for performance measures for each threat
- SHRIMP will recommend one or more options based on the additional action selected in Step 5
- Users can choose a SHRIMP option or describe their own measure(s)
- Choices are written into the DIMP plan

7. Report Results

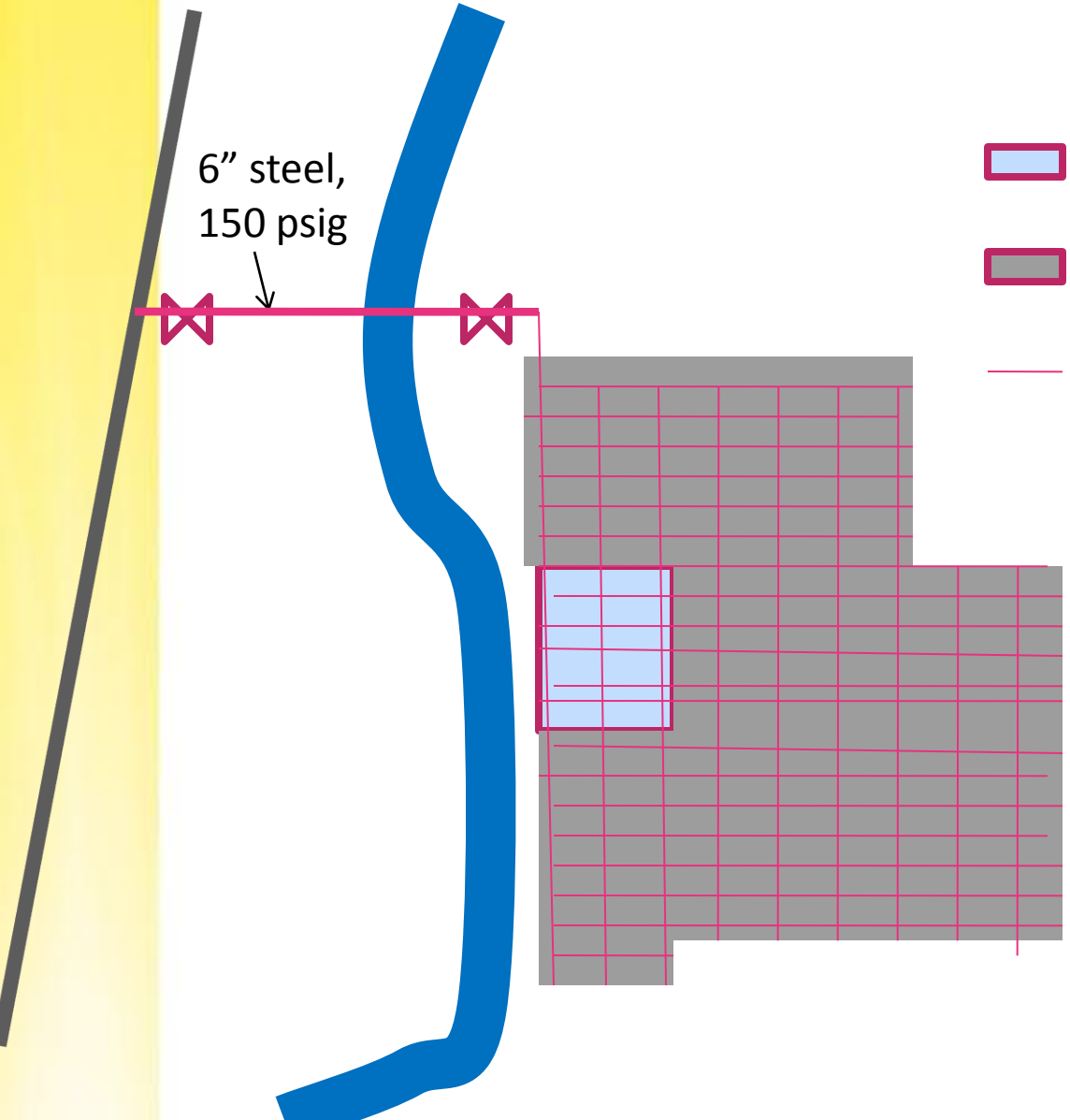
- Annual reports to PHMSA and state agencies
- Reporting via Annual Reports
- Final rule anticipated to include mechanical coupling failure reporting
- SHRIMP will address all required recordkeeping and reporting

Hypothetical Case Study

- Walk through the process of developing a plan for—

Kastanasburg

Welcome to Kastanasburg, 1950

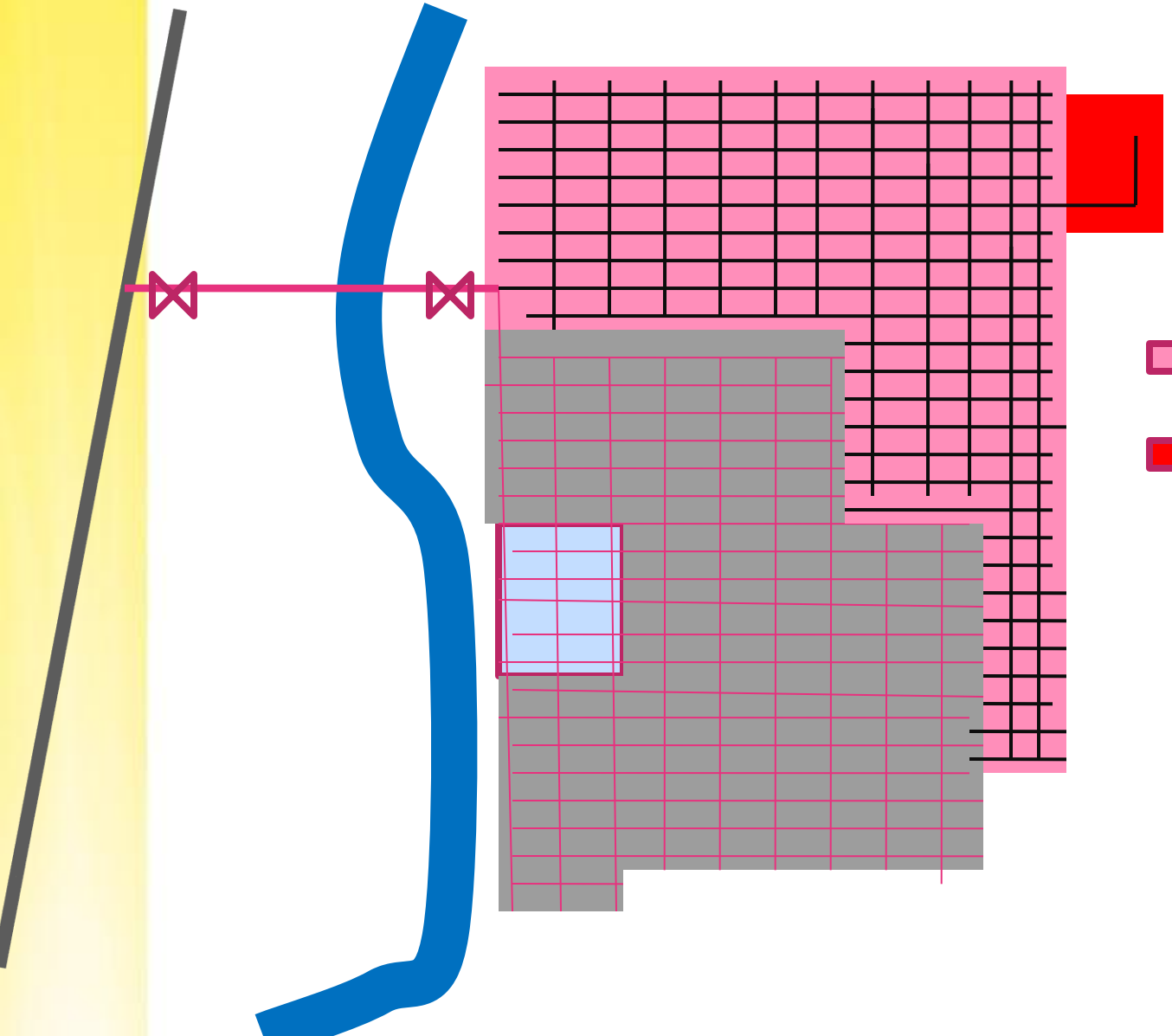


Downtown business district

Residential

1” – 4” Bare, unprotected steel mains and services, MAOP = 10 psig

Kastanasburg Expands, 1975

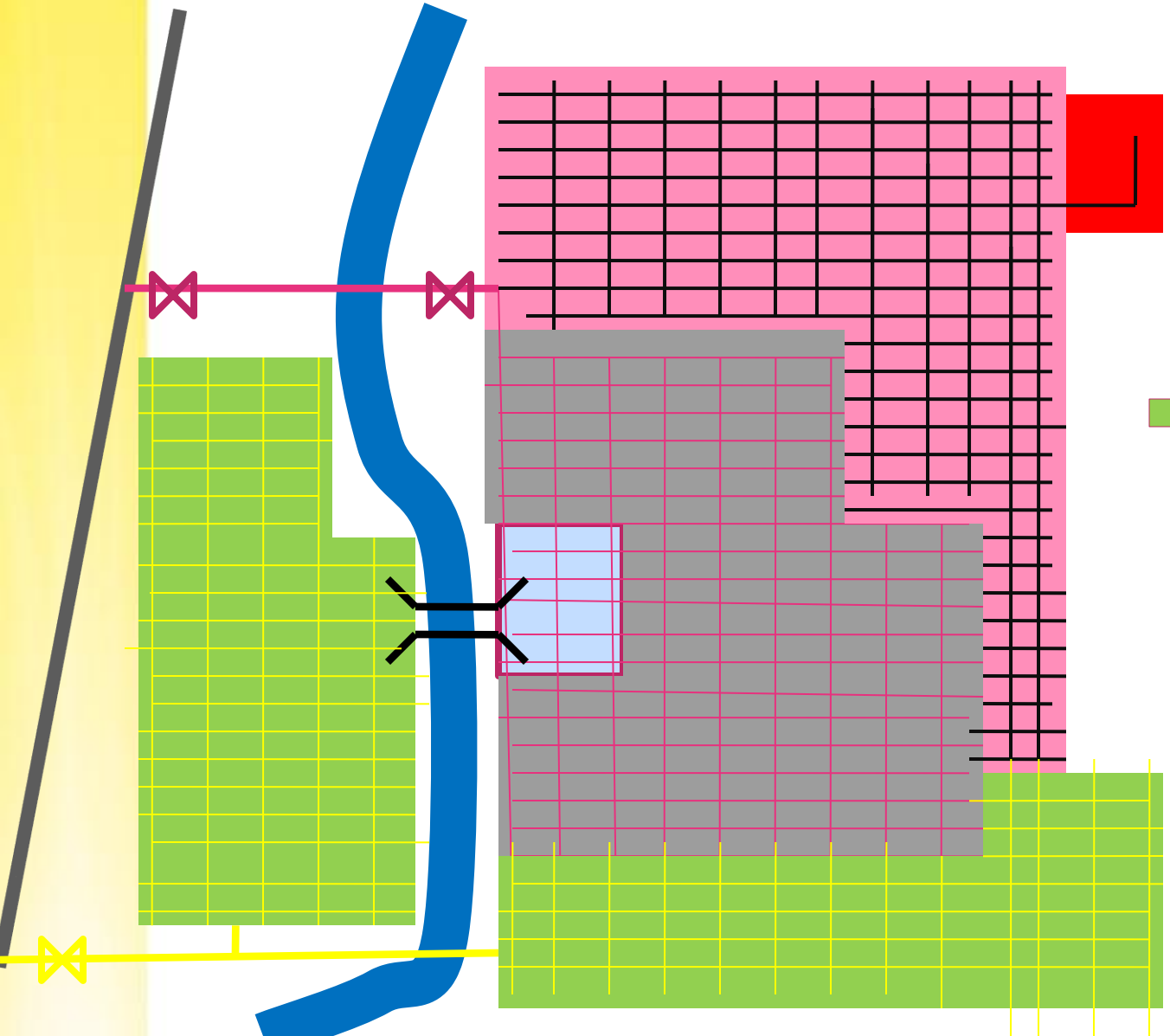


New residential

Mall

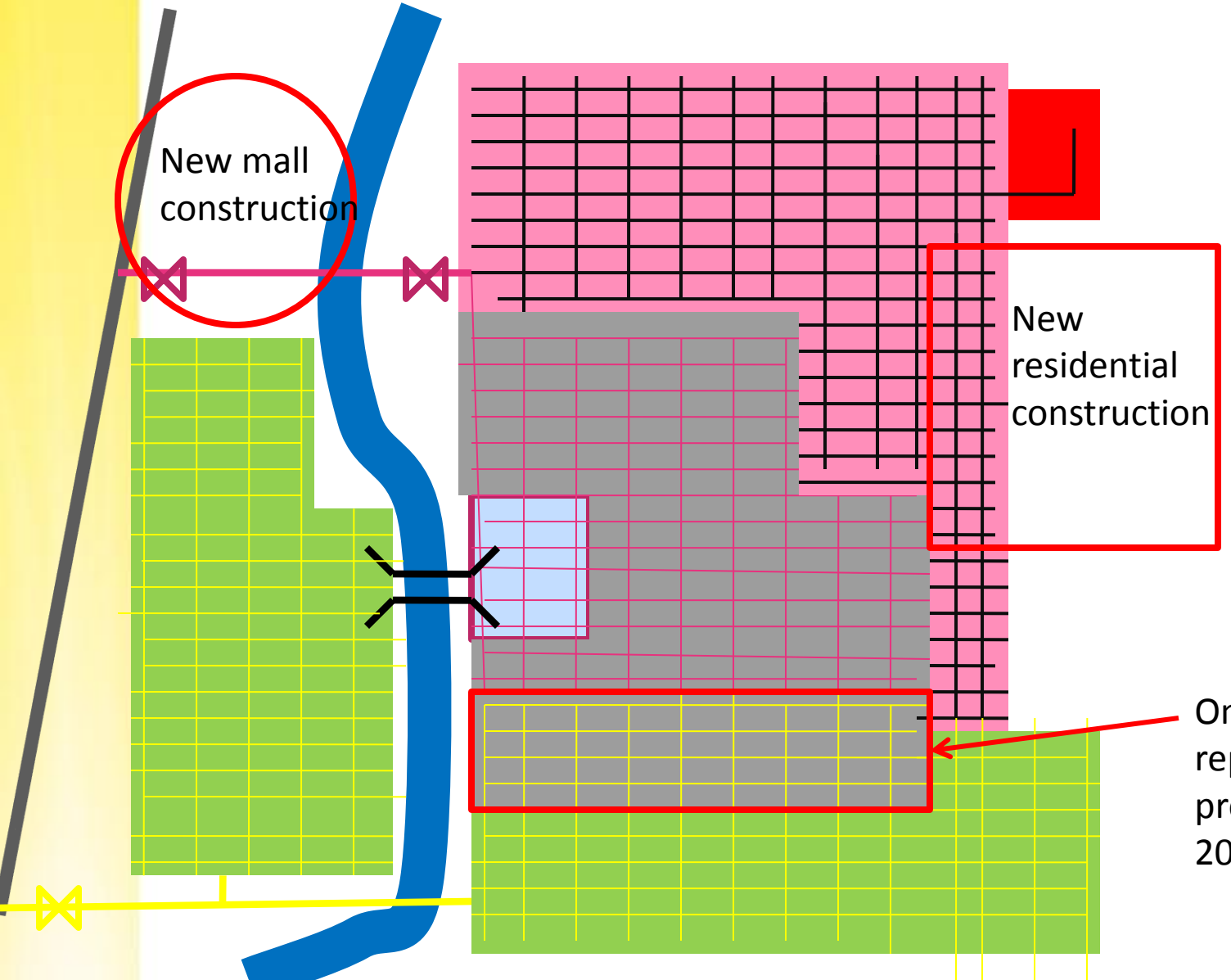
1” – 4” Coated,
Protected steel
10 psig

Kastanasburg Expands Further, 2000

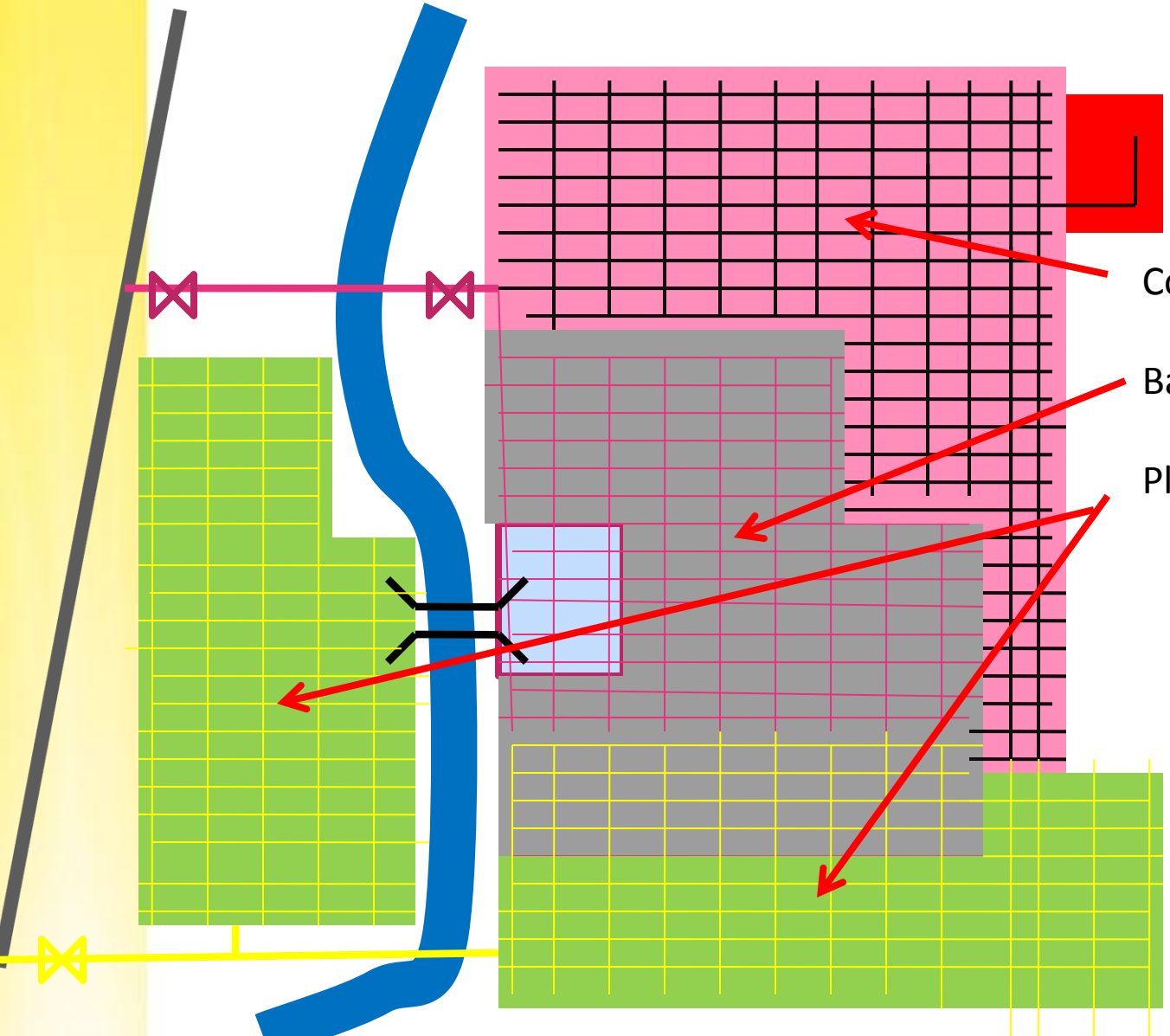


New residential
½” – 4 “ PE,
60 psig

Kastanasburg – Today



Corrosion Threat Segments

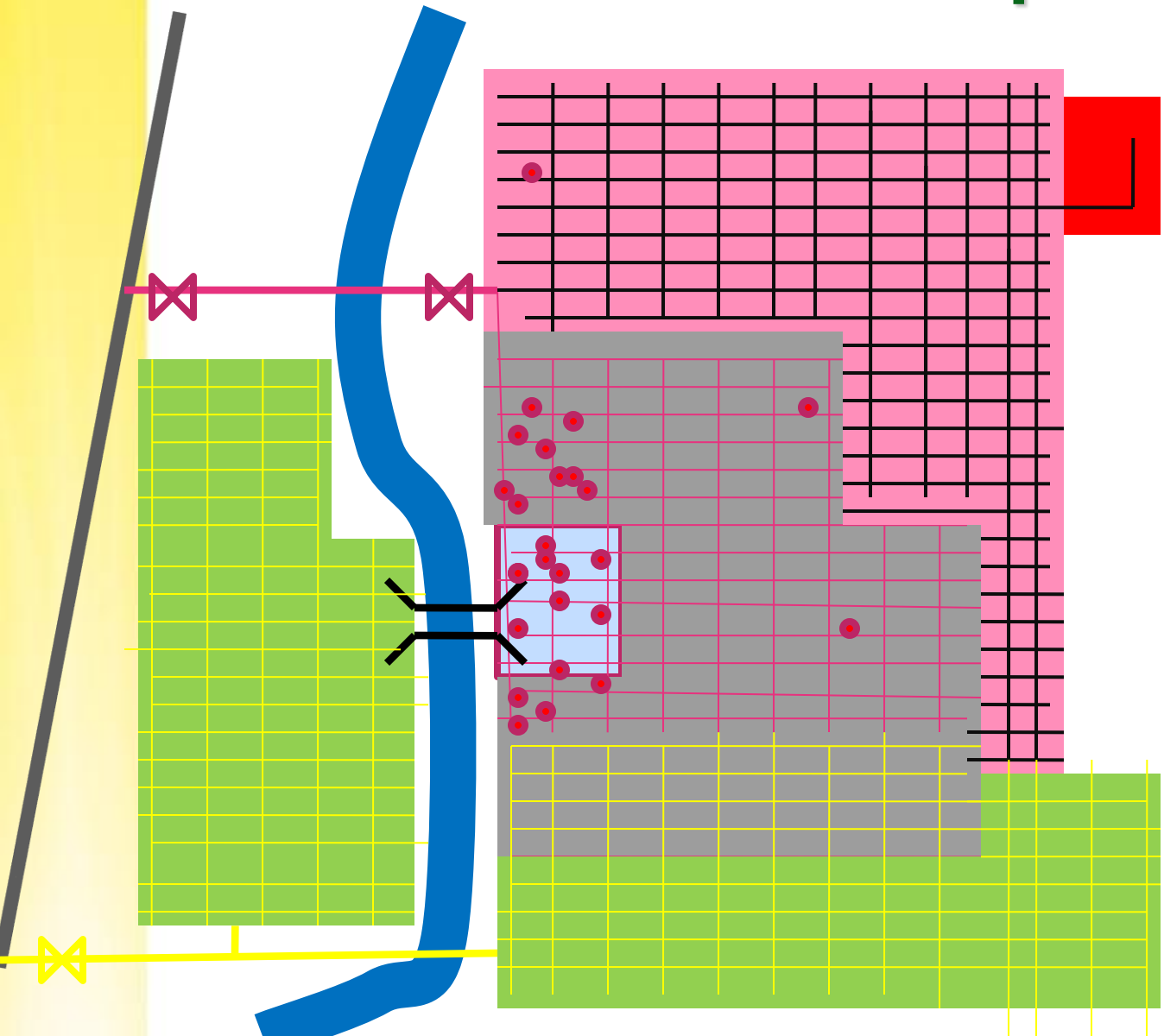


Coated, CP protected steel

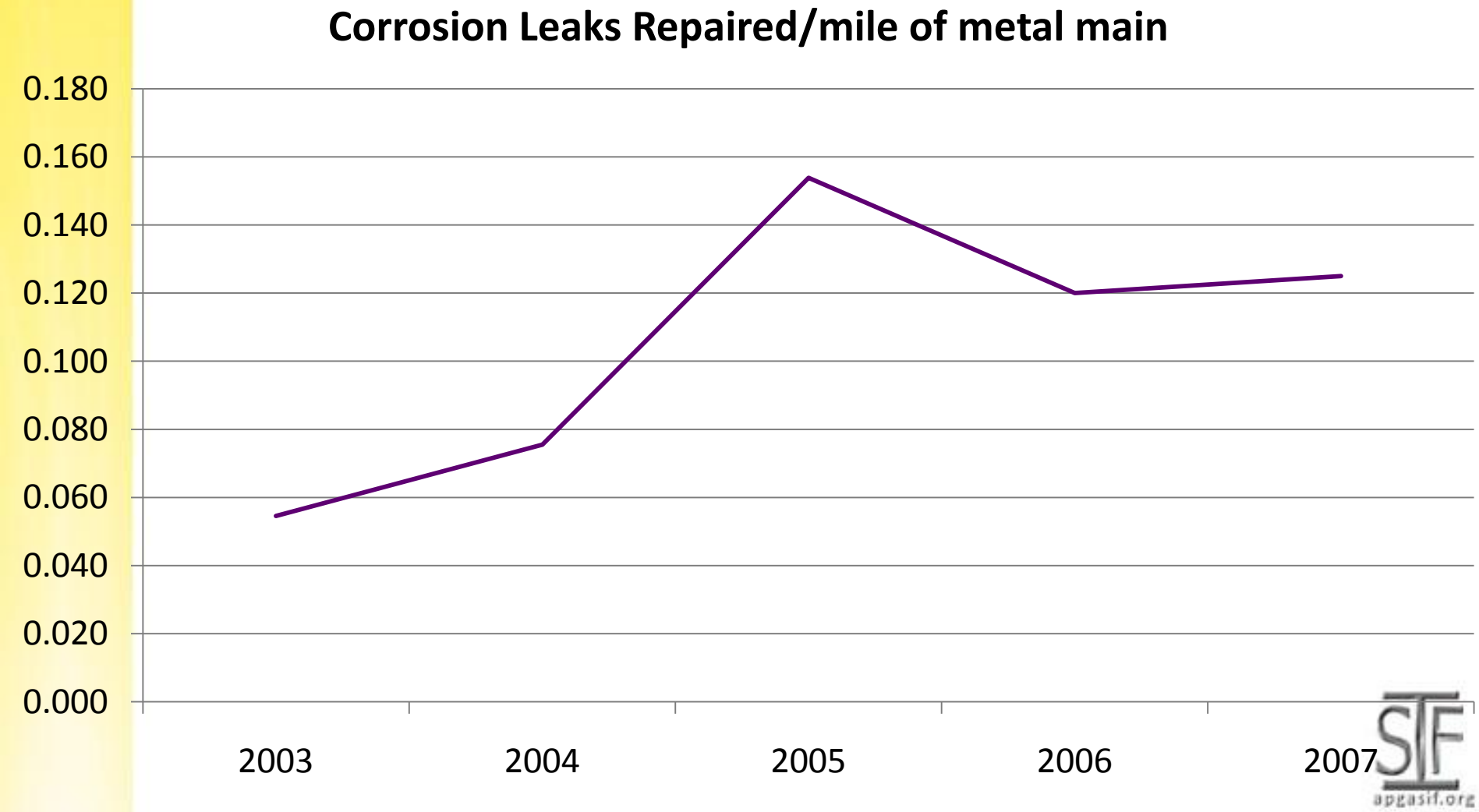
Bare unprotected steel

Plastic mains and services

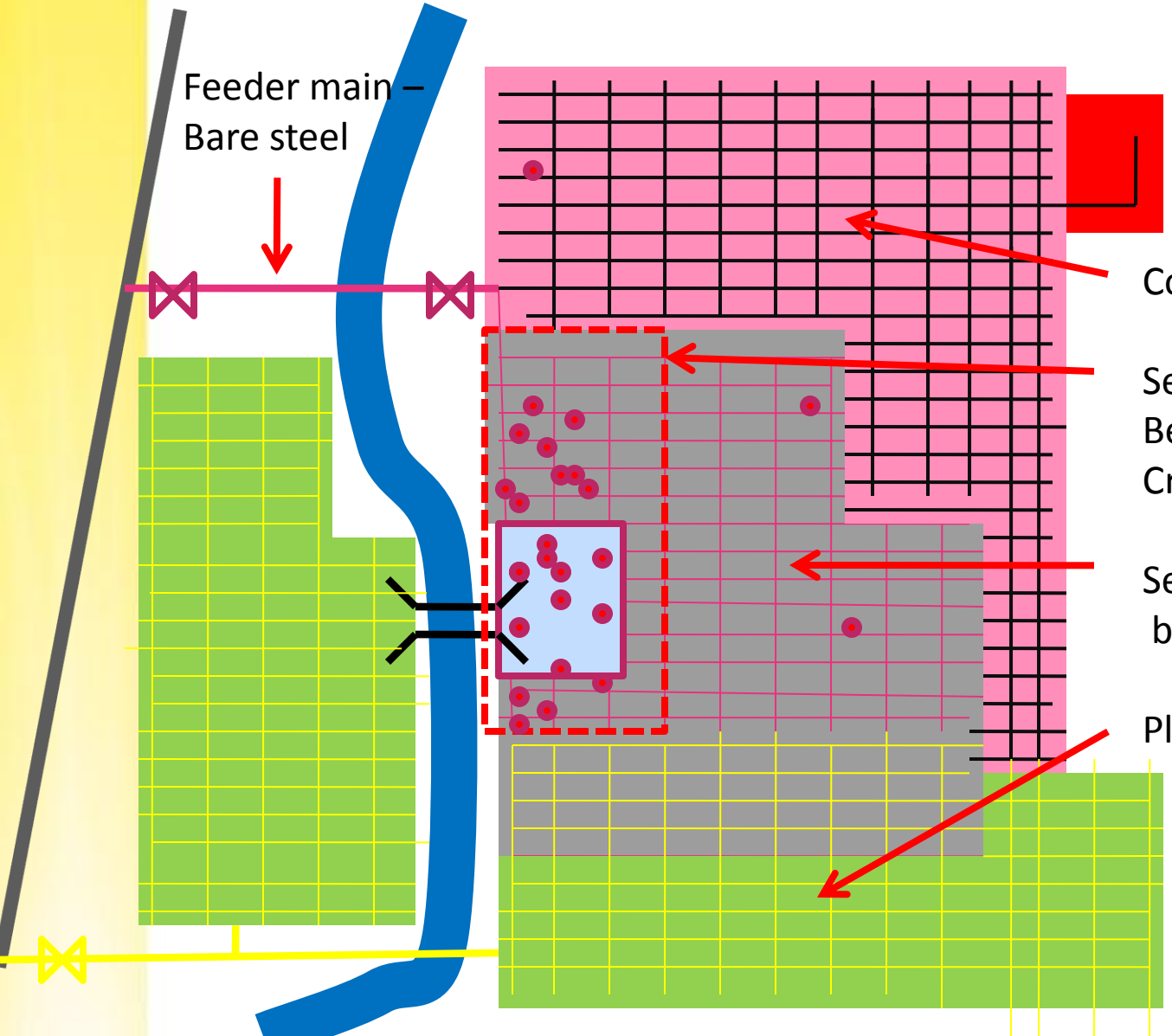
Corrosion Leaks Repaired 2003-2007



Trend in Corrosion Leaks Repaired



4 Corrosion Threat Segments



Coated, CP protected steel

Segment EC1: Bare steel Between 4th Ave and the Creek

Segment EC2: Remaining bare steel

Plastic mains and services

Consequence Factors

- User is asked for each segment would a failure here have greater consequences than average because of:
  - Larger diameter/higher pressure than most
  - In the business district under wall-to-wall pavement
  - The significance of the facility, and/or
  - The response time to get crews to it should it fail
- Results in multiplier of 1 to 1.5

Risk Ranking Model

- Risk = Probability times Consequence
- Each answer to threat and consequence questions results in a relative risk score
- Weighting for various questions is based on the expertise of the SHRIMP Advisors and consultants
- Additional weighting is based on historical data on probability that failures will result in death, injury or property loss
- Also weighted based on the user's annual report data

Risk Ranking

- Threat segments are ranked from highest lowest by SHRIMP
  1. Corrosion on bare steel in the business district
  2. Excavation near the feeder main
  3. Excavation on the Northeast side
  4. Corrosion on bare steel near the creek outside the business district
  5. Natural forces on 1950 creek crossing
- User can change the order but must enter an explanation why

Additional/Accelerated Actions

Corrosion on bare steel in business district	Replace 5% per year
Excavation near the feeder main	Inspect at least once per day
Excavation on the Northeast side	Increased public awareness
Corrosion on bare steel outside the business district	Increase leak surveys to once per year
Natural forces on two creek crossings	Inspect after heavy rains

Performance Measures

Corrosion on bare steel in business district	Replace 5% per year	Corrosion leaks repaired/mile and /service
Excavation near the feeder main	Inspect at least once per day	# of excavation damages
Excavation on the Northeast side	Increased public awareness	# of excavation damages
Corrosion on bare steel outside the business district	Increase leak surveys to once per year	Corrosion leaks repaired/mile and /service
Natural forces on two creek crossings	Inspect after heavy rains	# of natural force damage leaks repaired

SHRIMP Creates a Written DIM Plan

- Documents significant decisions made in previous steps
- Addresses all seven required elements
- Will include required provisions on LEAKS, EFVs and, most likely, mechanical coupling failure reporting
- A complete plan, NOT “DIMP-Lite”

Security

- Initial log in for a system will be verified with that system
- Initial user will be contacted to verify subsequent people attempting to log into that system
- Users can only see and edit their system's information
- Users can be read-only of full access

Pricing (Annual fee*)

System size (# of services)	
1-1000	Free
1001-5000	$ 100
5001-20K	$ 250
20K-35K	$ 500
35K-50K	$ 750
50K - 75K	$ 1,500
> 75K	$ 5,000

*Initial fee good through the 18 months allowed by the rule to write the initial DIMP Plan

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How Can I Prepare?

- Assemble your construction, inspection and maintenance records (5 years)
- Can you:
  - Separate leak repairs and exposed pipe inspections by material and Cathodic protection?
  - Plot leak repairs by cause and one-call locate tickets by geographic area on your system?
- Looking for concentrations of leaks, low CP, etc will assist in using SHRIMP

QUESTIONS?

Contact:

Gerry Lee
APGA Security and Integrity Foundation
glee@apga.org
417-766-2818

John Erickson
APGA Security and Integrity Foundation
jerickson@apga.org
202-464-2742

apgasif.org